DOCUMENT RESUME

ED 349 171 SE 052 995

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TITLE Ripples: A Big Sweep Elementary Activity Guide.
INSTITUTION North Carolina State Univ., Raleigh. Sea Grant Coll.
REPORT NO UNC-SG-90-02
PUB DATE 90
NOTE 40p.; Illustrator: Linda Noble. Funding for publication provided by the North Carolina Wildlife Resource Commission, the North Carolina Wildlife Federation and the Wallop-Breaux Act.
PUB TYPE Guides - Classroom Use - Teaching Guides (For Teacher) (052) -- Guides - Classroom Use - Instructional Materials (For Learner) (051)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Citizen Participation; Educational Games; Elementary Education; Environmental Education; *Learning Activities; Physical Environment; Plastics; Pollution; Recycling; Resource Materials; *Solid Wastes; Teaching Methods; Values; *Water Pollution; *Water Resources; Wildlife
IDENTIFIERS Environmental Awareness; Environmental Impact; *Environmental Issues; *Stewardship

ABSTRACT

Littering is a careless act indicating lack of respect for the environment, other people, and wildlife. Through education people can learn the consequences of littering and how to stop doing it. This book, designed for elementary children, presents a collection of 16 activities, ideas and resources concerning litter in the aquatic and marine environment. Some of the ideas can be modified for older or younger children. The format for each activity includes: (1) an introductory section that can be read to the class or group; (2) activity objectives; (3) time requirement and materials needed; (4) procedure and extension activities; and (5) a section that poses questions for reflection and discussion to explore opinions, positions, and ethics and environment. A glossary provides definitions of words used in the activities. A resource section that lists agencies and groups where additional information and assistance can be obtained and a materials section that lists supplemental curricula, audio-visual aids and information are provided. (MCO)

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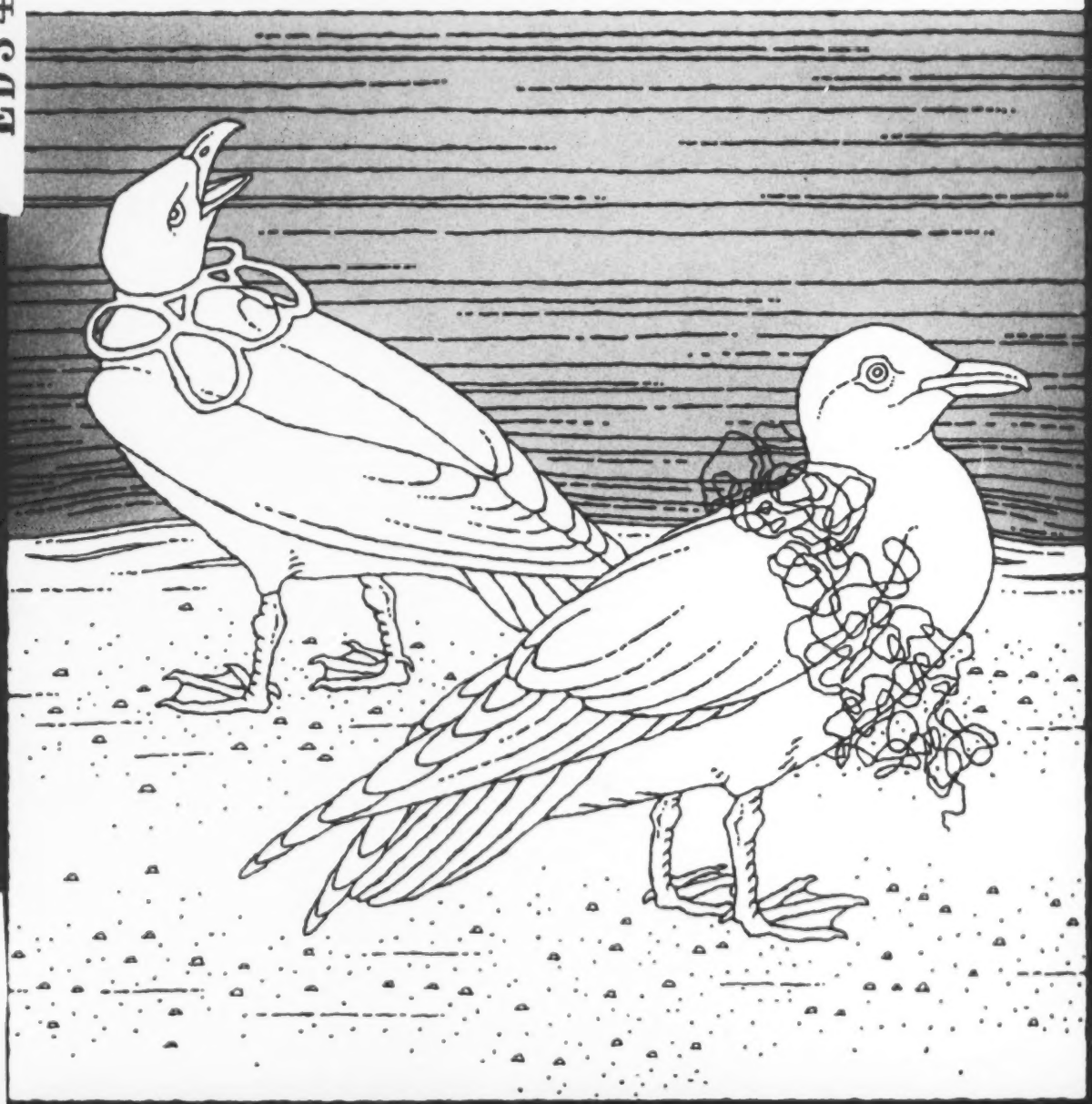
Ripples:

A Big Sweep Elementary Activity Guide



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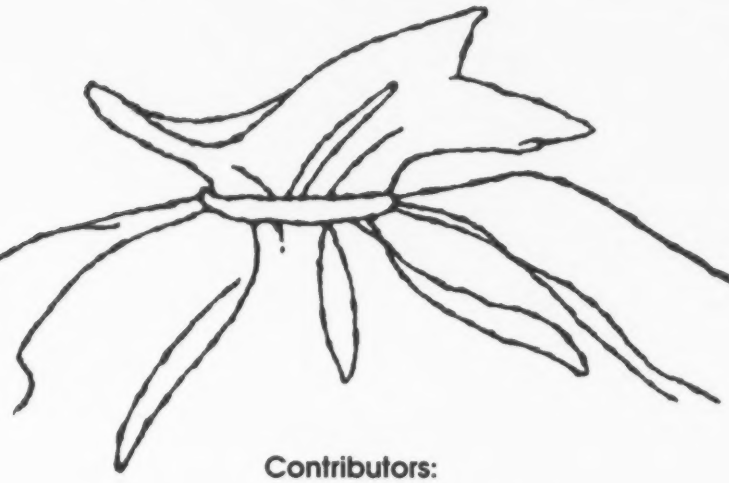

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This publication was funded with the generous contributions of the North Carolina Wildlife Resources Commission, the North Carolina Wildlife Federation and the Wallop-Breaux Act.
1990

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Introduction

Stewardship for the environment means taking personal responsibility for the quality of the world around us. What we do affects others. Like ripples widening in larger circles, we influence others by our actions and by sharing our values. *Ripples* is a collection of ideas and resources for you to share with children in schools, clubs or other organizations.

Littering is a careless act. People who leave their picnic trash at a park, toss cigarettes out of a window, dump garbage down a ravine or heave wastes over the side of a ship aren't caring. They haven't shown respect for the environment or other people. Nor have they considered the harm litter may cause wildlife.

We believe that if people thought about the effects of littering, they wouldn't. If trash cans were not available, people would carry their trash with them. Maybe they would even consider recycling, reusing or reducing waste. That's what education is all about — starting that thinking process.

Litter is very visible. We see soda cans, bleach bottles, broken toys, old tires, fishing line and plastic bags on our beaches and shores. Each of us can do something about litter. We can pick it up and see a cleaner shoreline.

Big Sweep, a volunteer-supported event to remove litter from North Carolina's beaches, lakes, rivers and creeks, gets people involved with the environment. Since 1987, thousands of people have participated. The event has won three national "Take Pride in America" awards.

In addition to picking up tons of trash, Big Sweep volunteers have collected data used to determine the composition, volume and possible sources of litter.

Ripples is a good start to understanding the problems. Volunteering at a Big Sweep site gives you even more insight. After that, the possibilities for involvement are limitless. You can help maintain a stream or beach nearby on a regular basis or even organize a local recycling effort.

See how the circles widen?

One person really can make a difference.

Big Sweep is held each September. For information on how to get involved, contact one of the agencies listed in the **Resources** section.

How To Use *Ripples*

Ripples is a collection of 16 activities concerning litter in the aquatic and marine environment. These are designed for the elementary or 9- to 11-year-old child. However, some of the ideas can be modified for older or younger children.

Each activity has the same format. The introductory section or lead-in can be read directly to the class or group. The litterbag graphic contains the objective of each exercise, the time required and the materials needed. "Procedure" explains what to do. "Stretching" gives ideas on extending the activity.

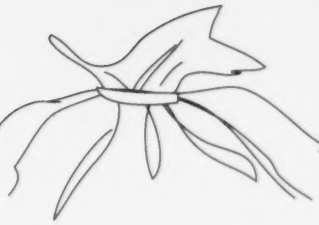
"Let's Talk About It" poses questions for reflection and discussion. Here, the children can express their opinions and explore their positions on ethics and the environment.

Glossary provides definitions of words used in the activities. Glossary words are boldfaced and italicized on first reference. **Resources** lists agencies and groups from which additional information and assistance can be obtained. **Materials** lists supplemental curricula, audio-visual aids and information.

Ripples is the Big Sweep's first educational publication. The material is not copyrighted, and we encourage you to duplicate any part of it for educational application.

Your suggestions and comments would be helpful for future printings. Please write to the Marine Education Specialist, UNC Sea Grant, Box 8605, NCSU, Raleigh, NC 27695-8605, or call 919/737-2454.

Getting out of a Bind



Objective: To teach empathy for wildlife by simulating an animal's entanglement in plastic litter.

Time: 15 minutes.

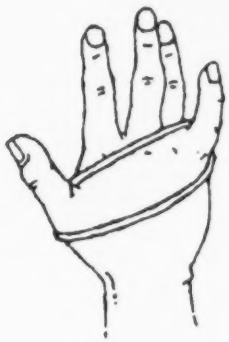
Materials Needed: One large rubber band for each child.

Humans are special. We have hands and fingers -- and the ability to use them to get out of a simple bind. If we were ***entangled*** in fishing line, we could probably free ourselves. How? (Cut line; untie it.)

But what about a seal, dolphin or duck? Let's see what might happen.

Procedure

Use a volunteer to demonstrate. Put a rubber band around the back of his or her hand, catching the thumb and little finger. Have the child try to remove the rubber band without using the other hand or teeth or rubbing it against something.



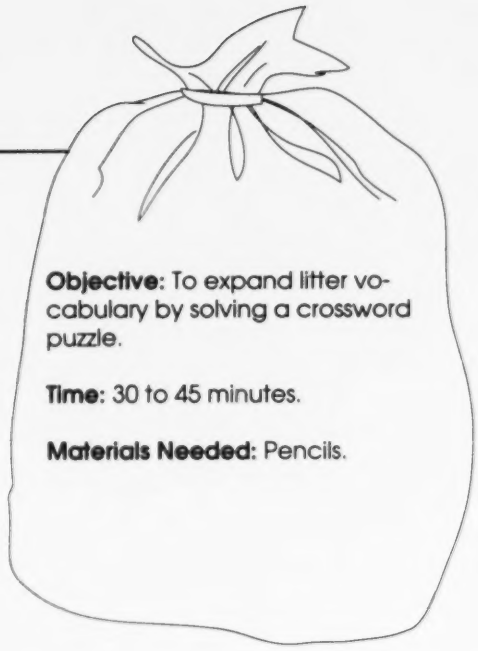
Hand out rubber bands for everyone to try. Tell each child to pretend his or her hand and arm is a goose entangled in plastic. For example, the hand is its head, the fingers its beak and the forearm its neck. Cup elbow with free hand. Place rubber band around "beak" or "neck." Allow children only 30 seconds to free themselves. No helpers!

Is everyone successful in untangling themselves? Many animals don't get free and can starve, strangle or suffocate.

Let's Talk About It

- What plastics or other material could the rubber band represent in a natural setting? (Fishing line, plastic six-pack rings, plastic bags, packing straps.)
- How could an animal get into a situation in which fishing line, plastic bags, strapping bands, six-pack rings or net would entangle it? (By swimming into plastic accidentally; by trying to eat a plastic bag or the food inside it. A bird might eat bait on fishing line, then become entangled or take the line back to a nestful of vulnerable babies.)

Litter Letters Crossword Puzzle



Objective: To expand litter vocabulary by solving a crossword puzzle.

Time: 30 to 45 minutes.

Materials Needed: Pencils.

Solve the puzzle to learn some important words for your waterway litter vocabulary!

ACROSS

2. A lightweight, oil-based material used in making cups, bottles, bags, pens and toys.
5. Annual shoreline cleanup event in North Carolina (2 words).
8. Material that can rot with the help of bacteria.
11. Rotting vegetables and grass that will turn into soil.
14. One way to decrease the litter problem is to _ _ _ _ _ _ the amount of our waste material.
15. Sea turtles and dolphins can mistake these latex or mylar objects for prey.
17. To take into the body by swallowing; to eat.
18. Recyclable metal material in some beverage cans.
21. A personal commitment to take care of natural resources.
22. A material that can rust.

DOWN

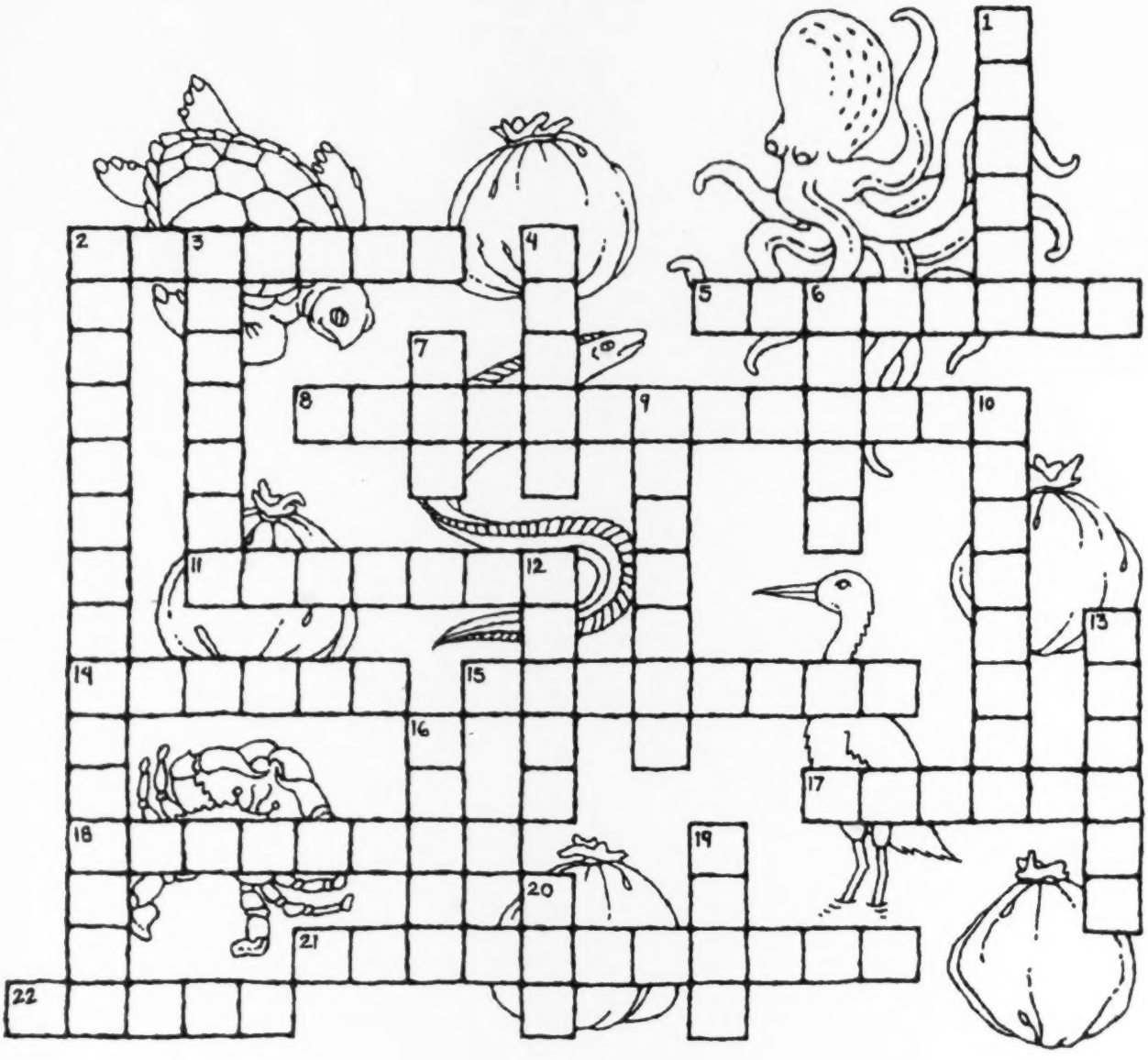
1. Container commonly tossed along the beach or shoreline. Holds bleach or beverage.
2. Sunlight causes this type of plastic to break into small pieces.
3. Having to do with water.
4. Material made from trees; used in books and magazines.
6. Clear, brown or green material used in drink containers. Can be melted and recycled.
7. Decay.
9. To reform and reuse materials such as glass, aluminum and paper.
10. To catch or ensnare animals as in an abandoned net or fishing line.
12. Once useful; now thrown away.
13. Trash left on beaches, roads and creek banks.
16. To use an item again.
19. Breakdown of iron from exposure to oxygen and water. Reddish-brown in color.
20. Plastic container for ice, bait or sandwiches; turtles often mistake for jellyfish.

WORDS USED IN PUZZLE

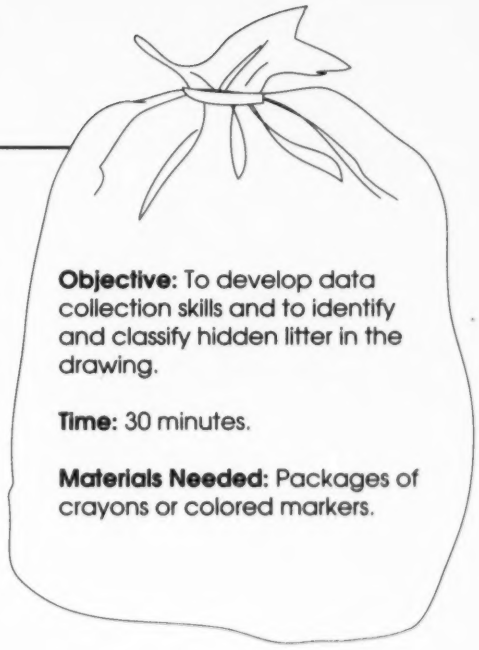
aluminum
aquatic
balloons
bag
Big Sweep
biodegradable
bottle
compost
entangle
glass
ingest
litter
metal
paper
photodegradable
plastic
reduce
recycle
reuse
rot
rust
stewardship
trash

8

Litter Letters Crossword Puzzle



Hidden Trash



Objective: To develop data collection skills and to identify and classify hidden litter in the drawing.

Time: 30 minutes.

Materials Needed: Packages of crayons or colored markers.

Each fall, volunteers clean up tons of trash from the shores of our oceans, lakes, rivers and streams.

But keeping our waterways clean is a never-ending job. There's more trash every year because people keep littering.

Much of the litter is plastic bottles, metal beverage cans and cigarette butts. People have even found tires, toilet seats and washing machines!

Let's identify some shoreline litter and discover which items are most abundant.

Procedure

Using the key, color the trashy items along the shore. The puzzle contains: three flip-flops, one sneaker, six bottles, one fishing line, three cups, two coolers and one rope (plastic); four cans, three drums and one stove (metal); two bottles and one jar (glass); two gloves, two tires, two hoses and one boot (rubber).

Record each piece of litter on the ***data*** card. Count the items and enter a total.

Stretching

- After all the trash has been colored, let children color the plants, sand and water. Encourage them to display their work.
- Enlarge the illustration to poster size and color or paint. This is a good exercise to prepare children for the Big Sweep event.
- To exercise graphing skills, develop bar, line, pie or picture graphs for the data.

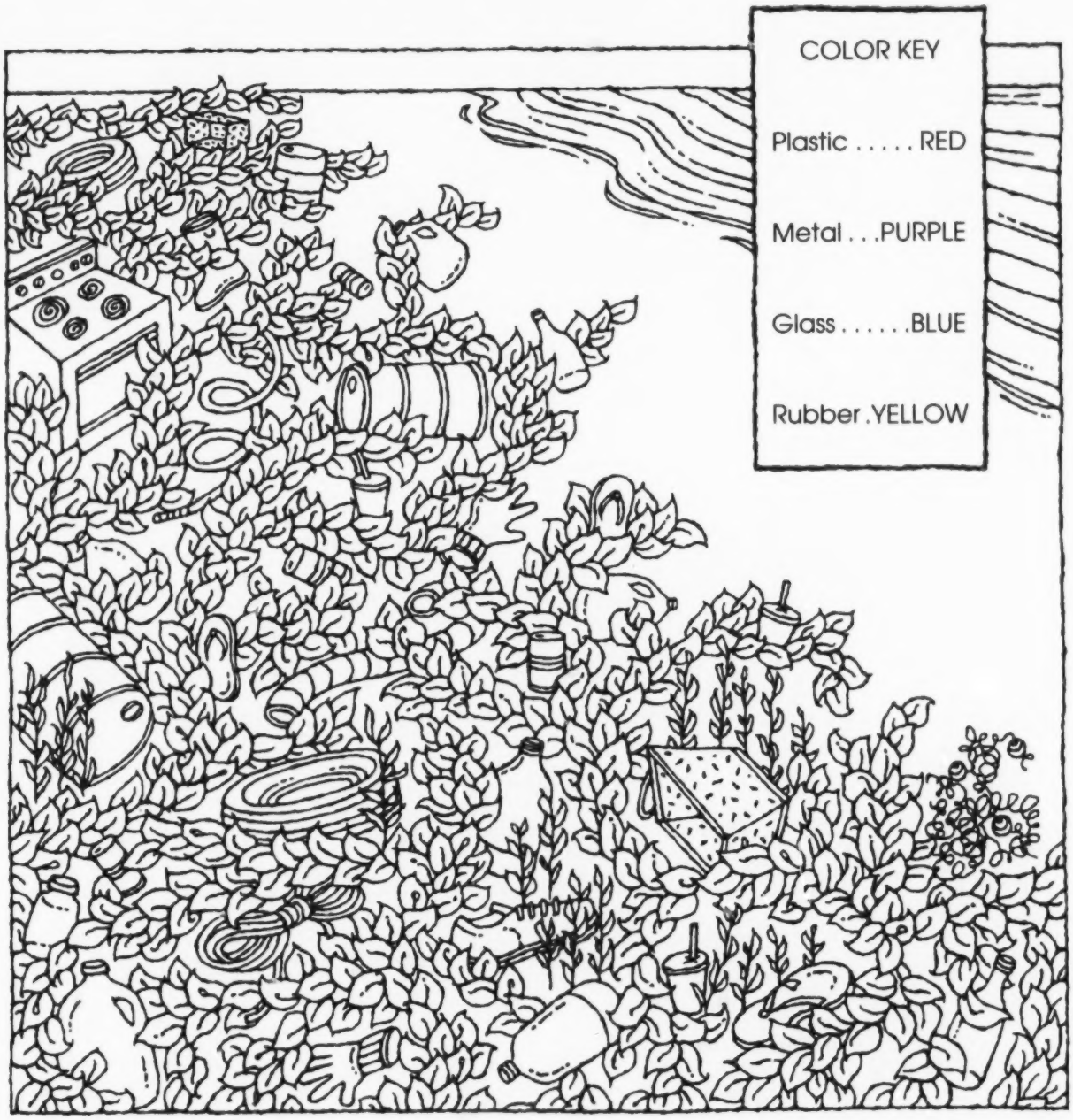
Let's Talk About It

- What kind of trash is most abundant? (Plastic.)
- Why do you think there's so much plastic found? (Billions of pounds of plastic are produced each year because of its convenience and durability. As litter, it's almost a permanent problem because it is not ***biodegradable***.)
- Where does trash in our waterways come from? (Careless users of our parks and beaches leave litter behind. Often, people on ships or boats dump their garbage overboard.)
- Can any of these materials be recycled? (Paper, aluminum, steel and glass can be recycled easily. A few places are even recycling plastics.)

The Big Sweep

A total of 3,645 volunteers collected 81.5 tons of trash from North Carolina's beaches and shorelines during The Big Sweep '89. The four-hour event was scheduled at 96 coastal and inland waterway sites. Plastics such as bags, fishing line and six-pack rings, all of which can choke a sea animal or trap a gull, accounted for 42 percent of the litter collected.

Using the key, color the debris in this shoreline picture. Then count the trash and list the items on the data card on the next page.



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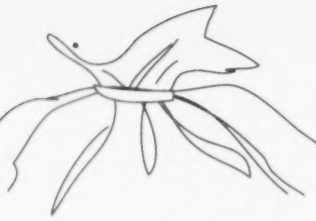
Writing Down the Data

Volunteers at shoreline cleanups write down everything they pick up. The tallies are then entered into a national database. Data is information from which conclusions can be drawn. By recording it, we're able to learn about waterway litter and where it comes from. Use the data card below to tally the trash you found in the picture. Use tick marks (𝍸) in groups of five to count the items.

DATA CARD		
Kinds of Trash	Number	Total
Appliances		
Boots		
Cans		
Cups		
Coolers		
Drums		
Fishing line		
Flip-flops		
Glass bottles		
Gloves		
Hoses		
Jars		
Plastic bottles		
Rope		
Sneakers		
Tires		

Who's Who in Plastic?



Objective: To use charades to increase awareness of plastics in daily life.

Time: 30 minutes.

Materials Needed: None.

Adapted from Project Learning Tree, The American Forest Institute Inc.

Does anyone know when ***plastic*** was invented? 1936!

Since the invention of plastic, people have used it in everything from telephones to car parts to computers. Plastics production in America grew to nearly 60 million pounds in 1988. That's more than 10 pounds of plastic for every person on the earth.

Can you think of where plastic is used in your home? In your school? Make a list. (Car parts, hoses, bottles, containers, balloons, telephones, computers, diapers, plastic wrap, shoes, chairs, hats and so on.)

Now we're going to play a kind of charades. Everyone think of a plastic item, but don't tell anyone yet! That's for you to know and us to find out.

Procedure

Have each child choose a plastic item to act out. Ask everyone to think about what their item's purpose is and what it looks like. They will each act out the item, as in charades.

You may want to divide children into groups for the game. Only gestures are allowed — no talking. Set a two-minute time limit for each charade.

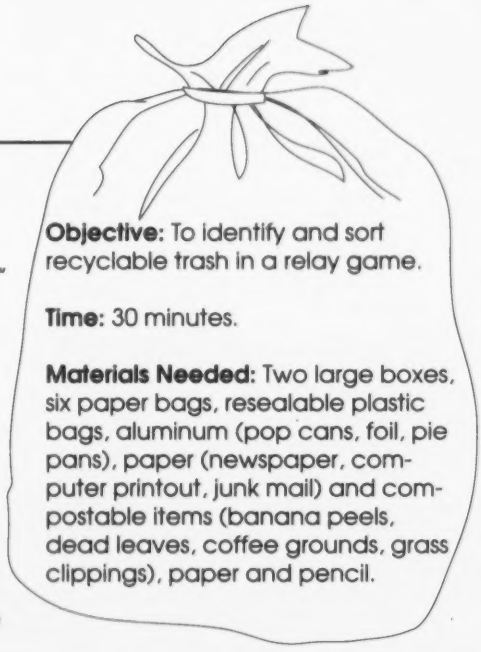
Stretching

- Instead of gestures, use words or phrases that describe the object without naming it. For example, "cylindrical, tall, see-through except for bottom part, holds fizzy liquid" describes a soft drink container. This is an excellent vocabulary-building exercise.

Let's Talk About It

- Why do you think plastics are used so much? (Convenience -- for lightweight items such as eyeglasses and beverage containers; safety reasons -- glass breaks, cardboard leaks; cost reasons -- production costs for plastic cheaper than paper.)

Be A Sport. Trash Sort!



Objective: To identify and sort recyclable trash in a relay game.

Time: 30 minutes.

Materials Needed: Two large boxes, six paper bags, resealable plastic bags, aluminum (pop cans, foil, pie pans), paper (newspaper, computer printout, junk mail) and compostable items (banana peels, dead leaves, coffee grounds, grass clippings), paper and pencil.

When anyone tells you America is a "throwaway society," that's garbage. Literally!

Each American generates nearly a ton of garbage a year. That's over five pounds per person every day!

This waste is burned, or more often, discarded in ***landfills***. But our nation is running out of landfill space, and land prices for new ones have skyrocketed.

One way to make a "molehill" out of our mountain of garbage is to ***recycle*** our ***solid waste***.

If the U.S. recycled just half of the newsprint it consumes every year, it would fill up 3,200 garbage trucks a day and keep six million tons of paper out of our landfills!

But before trash can be recycled, one kind of garbage must be separated, or sorted, from other kinds.

Why?

Because the procedures for recycling vary with the material.

For instance, old newspapers are cut up into small pieces, mixed with a starch solution and made into new paper. ***Aluminum*** cans or glass bottles, on the other hand, are melted down and molded into new containers.

You can even make use of your leftover meals. For instance, your table scraps can be used to enrich your backyard soil. This is called ***composting***. Doesn't that makes more sense than fertilizing the soil at the dump?

Let's relay the recycling message with a game!

Procedure

To prepare: Set up a relay course for two teams the length of a basketball court or longer. Place a trash box in front of each team, halfway down course. Fill each box with an equal amount of "clean" trash items - aluminum, paper and compostables. Include at least two items for each player. For each team, label three bags as "aluminum," "paper" and "compost." Place each team's sorting bags at course end, facing labels toward players at starting line.

To play: The first player from each team runs to box and pulls out one trash item. The player then runs to his or her team's bags and sorts the item as recyclable aluminum, paper or compost. Once item is dropped in bag, it cannot be changed to another bag. (If the relay course is long enough, the other teammates won't be able to distinguish the item or tell if it gets sorted incorrectly. This keeps the players from being put on the spot before their peers. However, the leader can stand near the bag and watch the sorting as a good check for understanding!)

Player runs back to home team. Next teammate repeats the procedure. Relay continues until trash box is empty and all players have returned and are sitting down. Teammates can cheer one another on but cannot yell out advice.

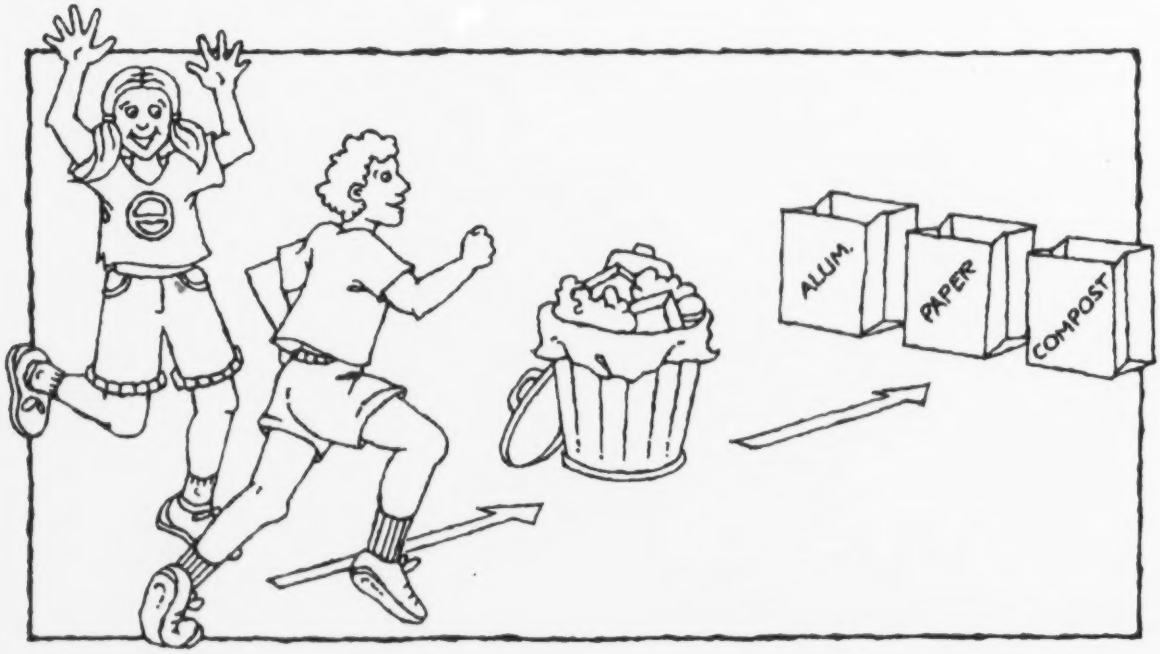
To score: Award one point to the team that finishes first. As a group, go through each team's sorting bags (teacher holds up item and group decides if it is correctly classified). Award one point for each trash item correctly sorted into its respective bag. Discuss which trash items were easy/difficult to sort and why. Award no point for an incorrectly sorted item. Discuss how item should have been sorted and why. The team with the highest score wins. Play the relay again and watch the scores improve!

Stretching

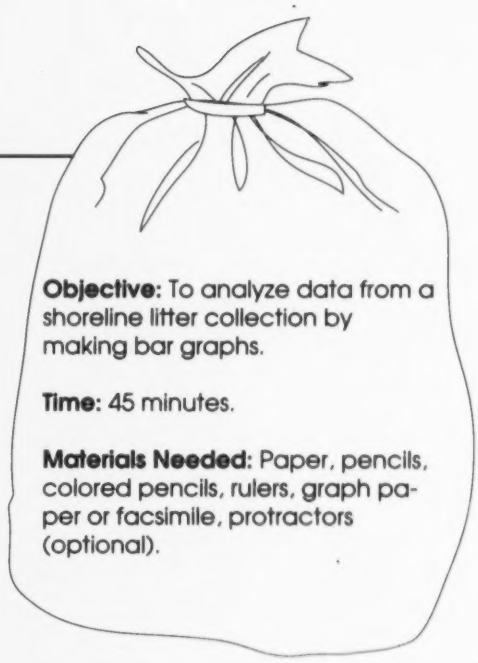
- Reduce the number of sorting bags to two, such as "steel" vs. "aluminum." Have players use a strong magnet to help sort the two metals.
- To challenge older players, increase the types of trash items and the number of sorting bags by adding "plastic" and "steel." (Omit "glass" as broken glass can shatter the fun and become hazardous waste.)

Let's Talk About It

- Why must trash be sorted before it can be recycled? (It saves steps in the re-manufacturing process; the method for recycling varies with the material.)
- Why should people recycle? (It's the responsible thing to do. It saves energy and other natural resources. It saves money.)
- Why do some people choose not to recycle? (It takes time and effort, and recycling centers are not always convenient.)
- How can people be motivated to sort and recycle their trash? (Personal ethics and social responsibility, clean surroundings, cash for cans.)
- Do you think recycling should be mandatory for everyone? Why or why not?
- Does your family sort and recycle its trash? Why or why not?



Litter Bar



Objective: To analyze data from a shoreline litter collection by making bar graphs.

Time: 45 minutes.

Materials Needed: Paper, pencils, colored pencils, rulers, graph paper or facsimile, protractors (optional).

If we're good detectives, we can use clues to find out more about ***litter*** on our shores. During Big Sweep cleanup events, volunteers record each piece of litter they pick up on a data card. Later, the numbers are added together to show the kinds and amounts of litter collected. With this investigation done, we can look at the big picture. What kinds of shoreline litter are most common? How did it get there? First, let's do some math and figure out how to look at these numbers.

Procedure

Using one or both of the data sets, follow the instructions for the appropriate skill level. You may want to cover up the percentage list so the children can derive the percentages themselves. Round off numbers for easier manipulation if necessary. Also you may have to help determine the best units for the vertical axis, for example, units of 10,000 for Set 1 and units of 1,000 or 10 percent for Set 2.

For children with fewer math skills:

- Use the percent column in Data Set 1.
- On the graph, draw a bar representing the percent of each of the materials found in the cleanup.
- Color each bar a different color.

For children with more math skills:

- Use either or both data sets.
- Add the pieces of litter to get a total.
- Divide each type of litter by the total, multiply by 100 to get percent.
- On the graph, draw a bar to represent the percent of each of the types of litter.

Stretching

- If math skills are more advanced, convert percentages to degrees and create a pie graph using a protractor.

Let's Talk About It

- What do you think is the source of this litter? (People abandoned their picnic trash; fishermen tossed their debris; people on ships at sea dumped their garbage overboard.)
- What is litter most often made of? (Plastic, plastic foam.) Why? (Plastic doesn't degrade; it is light and gets blown by the wind or floats to the shore.)
- What suggestions do you have for reducing litter? Consider that much of the litter is drink containers and food packaging. (Reduce the packaging for fast food; provide more trash cans; make recycling very easy for consumers.)
- Why are numbers important for a cleanup? (To find out what the most common materials are; to make your analyses based on fact, not opinion, so that your debate concerning sources of litter will be more credible.)

With your teacher's instruction, use the information in the data sets to create a bar graph.

Data Set 1

Trash Totals: Big Sweep '89 Fact Sheet

Type of Materials	Pieces	Percentage
Plastic	70,340	42.2
Plastic Foam	25,781	15.5
Metal	23,567	14.2
Glass	18,664	11.2
Paper	16,757	10
Wood	6,985	4.2
Rubber	2,416	1.4
Cloth	2,134	1.3

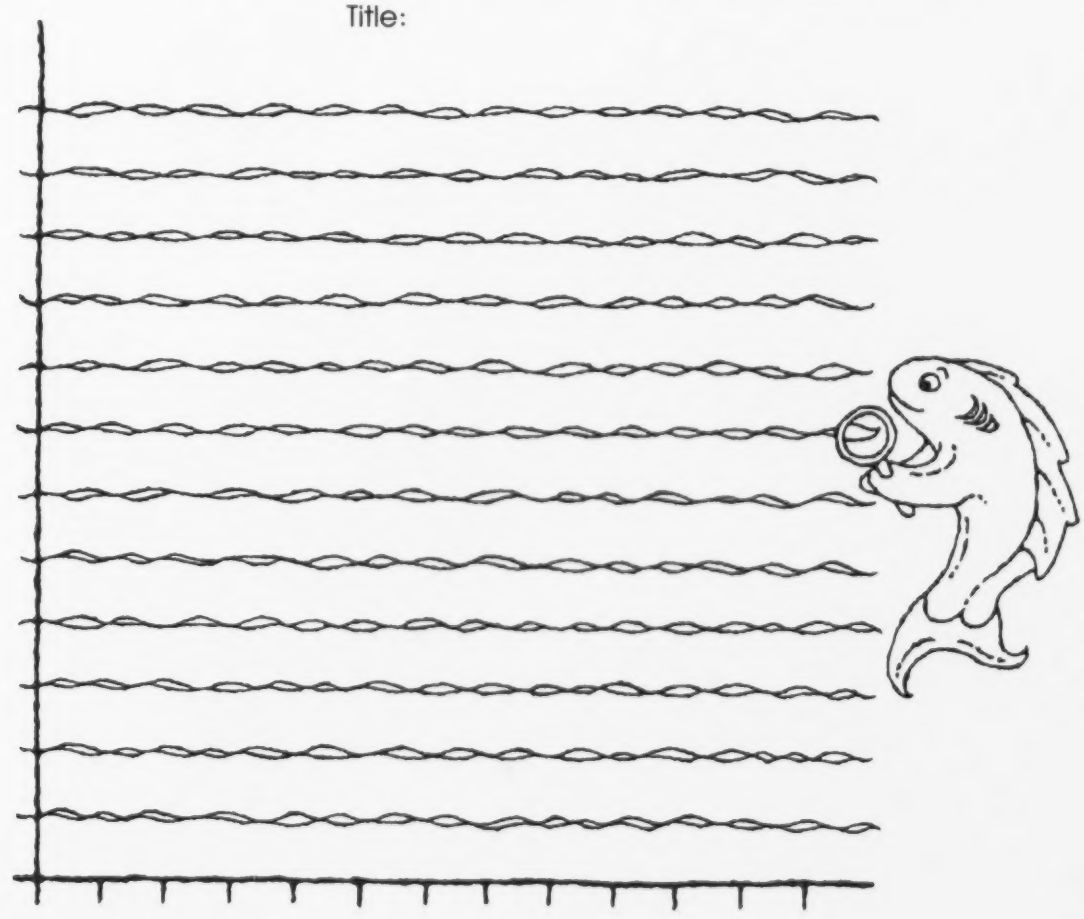
Total Pieces: 166,6444

Data Set 2

North Carolina's "Dirty Dozen"

Type of Litter	Pieces Collected
Metal beverage cans	13,123
Plastic pieces	11,816
Plastic soda bottles	11,052
Small plastic foam pieces	10,596
Glass beverage bottles	9,503
Plastic cups/picnic utensils	9,103
Plastic foam cups	8,102
Paper pieces	6,955
Plastic caps and lids	6,507
Glass pieces	6,153
Wood pieces	6,101
Plastic trash bags	5,965

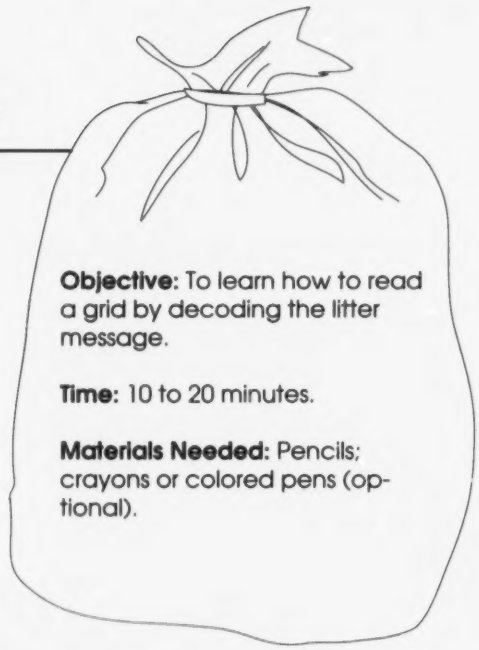
Title:



Label (#)

Label (types)

Breaking The Litter Code



Objective: To learn how to read a grid by decoding the litter message.

Time: 10 to 20 minutes.

Materials Needed: Pencils; crayons or colored pens (optional).

How many pounds of litter do you think are found in the ocean each year?

Would you believe over 14 billion pounds?

That litter is generated by many sources, from boats and oil rigs on the water to picnickers and bathers along the shore.

This ***debris***, especially plastics such as six-pack rings, strapping bands and fishing line, entangles and maims creatures who live in the water.

People who litter need to get the message.

Solve the puzzle to find out what it is!

Procedure

Use the grid to match the number-letter clues and discover the hidden message, "Don't teach your trash to swim."

If there's time, color the picture afterward.

Stretching

- Make a secret message grid of your own and share with others.
- Show the slide show, "Marine Debris," or the video, "Trashing the Oceans," to initiate discussion and get ideas. (See Materials, p. 35.)

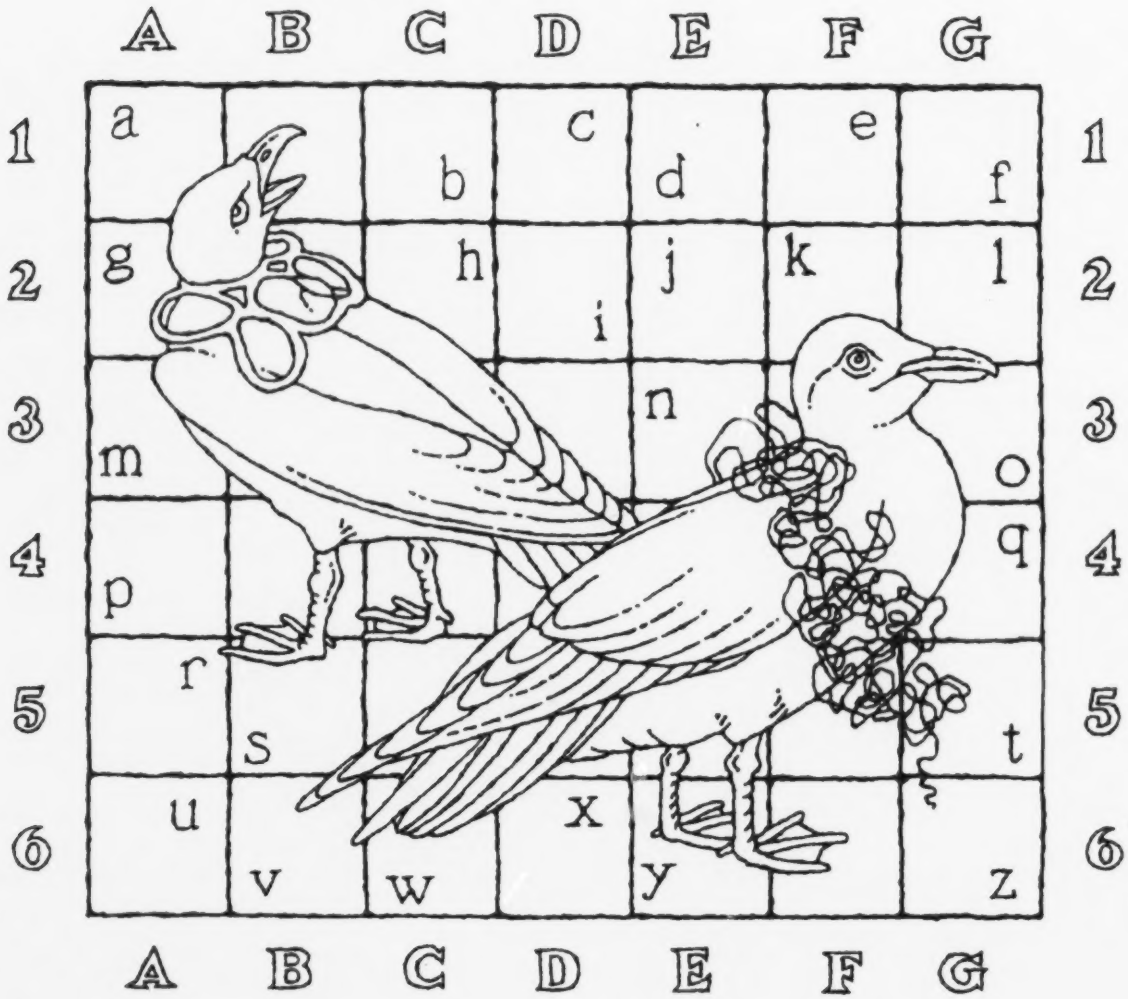
Let's Talk About It

- Name some problems caused by plastic litter in the water. (Animals are trapped and entangled. Boat propellors become ensnared.)
- What can you do to prevent these problems? (Don't toss six-pack rings, fishing line and old nets on the shore or overboard.)

Use the grid to match the number-letter clues and fill in the blanks. The first one's been done for you. Discover an important message about littering!

D
1E 3G 3E 5G 5G 1F 1A 1D 2C 6E 3G 6A 5A

5G 5A 1A 5B 2C 5G 3G 5B 6C 2D 3A



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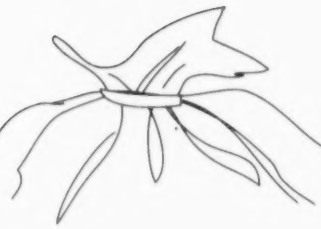
A Beautiful Day



Objective: To recognize some of the intrinsic values of litter-free woods and streams through guided imagery.

Time: 30 minutes.

Materials Needed: Art and writing materials, tape of sounds from a forest or stream environment (optional).

Have you ever gone on a picnic or visited a stream and explored along its banks? On one of those picnics or stream walks, do you remember seeing litter and how out of place it looked? Did it make you feel bad inside? Like someone had done something wrong?

We're going to explore some of these experiences and feelings through guided imagery.

This is a fantasy activity. Each person's story and images may be different and that's OK. Just relax, close your eyes, and make your own pictures in your head.

Procedure

Do some relaxing exercises. Slowly tilt your head to the left, to the right, forward and back. Take a slow breath in. Exhale completely.

Invite the children to get comfortable. Have them close their eyes, relax and try to imagine in detail what they are about to hear. Then read the following story:

Relax. Sit or lie comfortably and close your eyes. Relax. Your parents have brought you and your friends on a picnic at the edge of a stream.

You're at the shaded picnic table where the meal has been spread. You eat, enjoying some of your favorite foods. When the meal is over, you carefully place your garbage . . . cups . . . glass . . . plastic bags . . . paper . . . back in your picnic basket. You want to leave the picnic site as clean and neat as it was when you found it.

You and your friends are ready for your hike. You race each other toward the stream and into the bright warm sunshine. You shade your eyes from the sparkle on the water. Listen to the water rushing over the rocks, swirling up against the bank and lapping gently against the little sandbar nearby. You turn and walk the trail along the stream bank, the sun at your backs, the wind in your faces. You each share what you notice. The smell of a flower. The color of a dragonfly. The way the tree branches move in the breeze. A raccoon's track. The call and flight of a kingfisher. The way your feet sink slightly in the sandy bank.

As you walk and share, you also notice other things you haven't been talking about. Old soda pop cans. Broken bottles. Cigarette butts. A tire. A torn garbage bag with garbage spilling out. Some old oil cans. A pile of foam cups. Cardboard and plastic packaging.

As you follow your footsteps back, you mention to your friends that you've enjoyed the hike. But the trash detracted from your experience. You play a trash pick-up game on the walk back.

You pick up some discarded plastic bags and start picking up the glass, the cans and all the other things, stuffing them in the bags. As you walk, you continue to point out figures and shapes in the clouds . . . beetles. . . a rabbit rustling through the leaves . . . all the while keeping a sharp eye out for litter. Keep the game going.

When you get back to the picnic area, you share with your parents your treasures, the natural ones and the trashy ones. Think about how you and your friends feel. What do your parents think of you?

It was a wonderful hike. You left the streamside trail a more beautiful place to visit. You left it a safer place for the animals that live in the stream and along the bank.

Now, slowly come back from your picnic outing. Come back to your relaxed body. Slowly open your eyes and come back to the room.

Stay quiet for a few minutes and review your picnic and hike. Remember the things that made you smile.

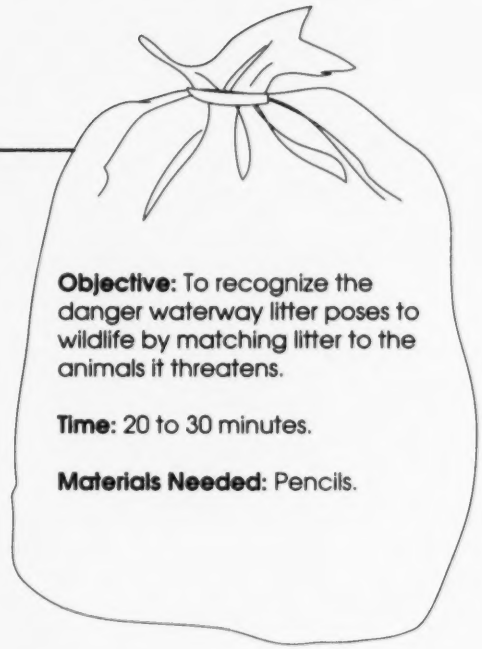
Stretching

- Write a story or poem or draw a picture about a beautiful place you like to visit.
- Start a "pass-it-on" story in which you imagine you are a piece of litter on a journey through the environment. For example, you could be a foam cup that is tossed into a ravine and eventually ends up at sea.

Let's Talk About It

- What did you like best about this imaginary trip?
- What did you dislike most about the trip?
- Do you have a favorite place to visit outdoors?
- Name some kinds of trash you have seen in beautiful outdoor places.

Litter to Critter



Objective: To recognize the danger waterway litter poses to wildlife by matching litter to the animals it threatens.

Time: 20 to 30 minutes.

Materials Needed: Pencils.

What do you think happens when an animal comes across litter in its natural ***habitat***?

A plastic six-pack ring is out of place in a watery environment. Especially after a curious beaver has gotten its head or feet hopelessly entangled in one!

A plastic bag keeps your sandwich tasty at the beach. But if abandoned, that bag could be a deadly meal for a sea turtle or dolphin swimming in the ocean.

Litter causes all kinds of problems for animals. Animals get caught and hung up on hooks and wire. They crawl into glass bottles and can't get out. And they get cut on the jagged edges of broken bottles and metal cans.

Let's think about some of the bad things that can happen when critter meets litter.

Procedure

Draw a line from the litter on the left side of the page to the animal it might harm on the right. Note that each type of litter might have more than one match.

After the activity, discuss the possible matches. For example, an otter might get its head stuck in an open metal can, or a sea turtle might swallow a plastic bag. Be flexible with the children's answers and the possible combinations.

Let's Talk About It

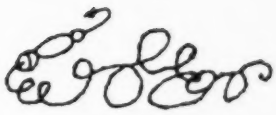
- Which animals can be affected by litter? (Animals with curious natures such as seals, otters and beavers; animals that scavenge for food or are less picky eaters, such as pelicans, sea gulls, raccoons and some fish.)

- Which litter hurts the most animals? (Plastic bags, fishing line, six-pack rings, plastic foam.) What do all these types of litter have in common? (All are plastics, all last a long time.)

- How could a plastic bag be deadly for a dolphin or turtle? (The animal could choke on the plastic item while trying to eat it. Once swallowed, the plastic item could block digestion or remain in the stomach, causing the animal to feel "full" and eat less than it needs to survive. Also, plastic and plastic foam in an animal's stomach can cause excess ***buoyancy***, decreasing the animal's ability to dive under the water after prey.)

- Which animal is responsible for the litter? (Humans.) What can we do to help solve the problem? (List the suggestions and pick out two to five of them to put into action. Follow up in a week to see how effective those actions have been and what has been learned by following through on these recommendations.)

Draw a line from the litter on the *left* to the animal it might harm on the right. Remember, each type of litter might have more than one match!



fishing line

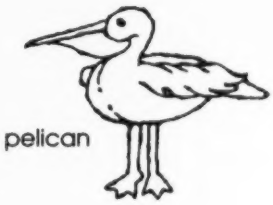
six-pack ring

plastic bag

plastic foam pieces

metal cans

fishing net



pelican

seal

fish

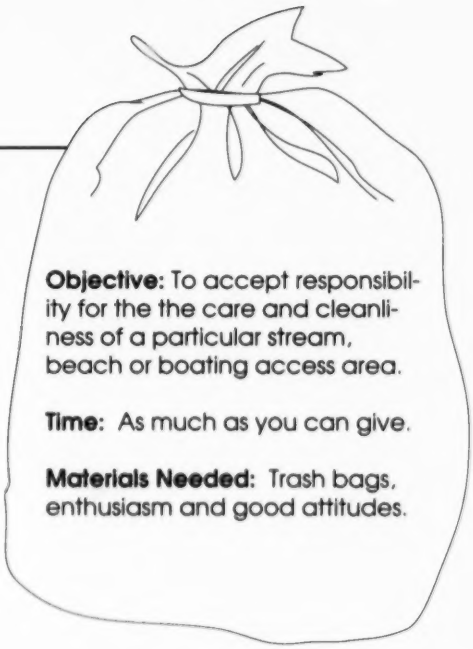
dolphin

sea turtle

deer

otter

Little Orphan Eddy



Objective: To accept responsibility for the the care and cleanliness of a particular stream, beach or boating access area.

Time: As much as you can give.

Materials Needed: Trash bags, enthusiasm and good attitudes.

Streams, beaches and boating access areas are crucial habitats for wildlife. They are also important to human health and recreation.

However, no one person owns them, and so no single person is in charge of keeping them clean.

But natural resources such as public waters actually "belong" to everybody, and everybody should look after these areas.

This doesn't mean you have to become caretaker for every pond, creek and estuary, but you can do your share.

Is there a creek on or near your school property or city park?

Do you have a favorite beach or even an access area where you put your boat in the water?

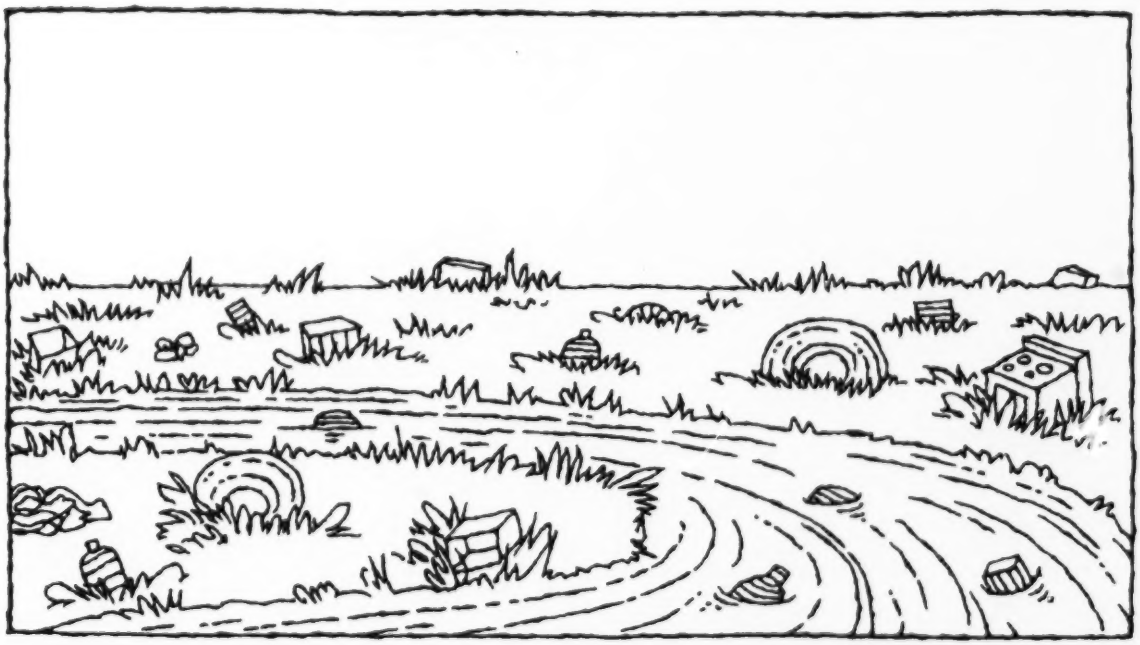
If so, you could adopt this area and keep it clean and healthy. That's practicing ***stewardship***.

Procedure

To adopt a stream, pond or lake, call the Streamwatch coordinator in the Division of Water Resources at 919/733-4064.

To adopt a boating access area, call the Wildlife Resources Commission at 919/733-3633.

Or your group can take a less formal approach. Just take plastic bags to your favorite area



and clean it up. Most adoption programs suggest that you clean your area quarterly. You may want to do it more often.

Be safe. Wear gloves. Work in pairs.

Notify local police or the state Division of Environmental Management if you observe large leaking barrels, domestic household dumping or discolored water.

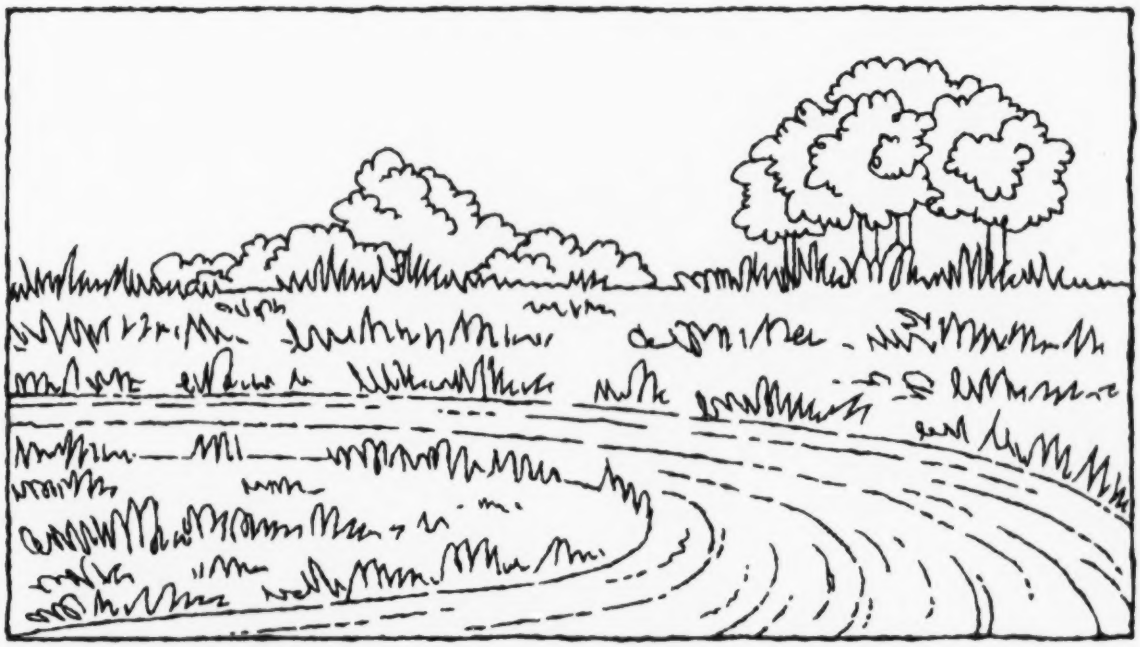
Keep a record of what you and your partners find at each cleanup. This will let you know whether you are influencing users of the spot positively.

Stretching

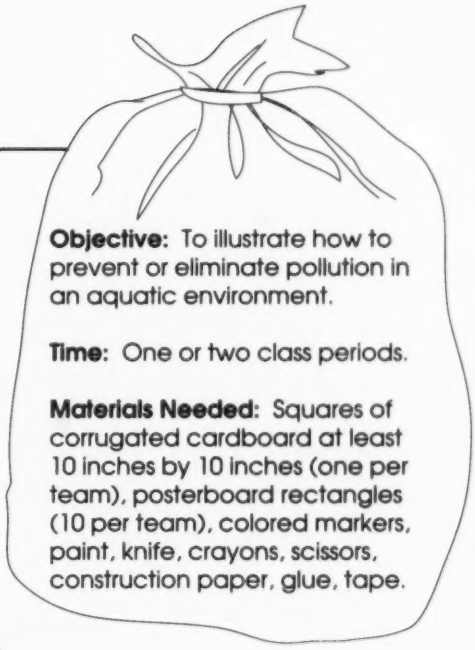
- Take a field trip to your chosen area and go for a hike or canoe ride. Where do you see litter?
- Determine if any of the trash you collect might be recycled and how you might do this.
- Look for aquatic organisms. The health of the stream, lake or sound is often measured by the life in the water. Look under rocks in the water for insects. Seine for minnows. The more living things you find, the healthier the water. This is called biomonitoring.
- If applicable, plant trees and shrubs to benefit wildlife.

Let's Talk About It

- Why do people pollute these areas? (They are careless and inconsiderate or unaware of the problems littering causes.)
- What can be done if you find severe water pollution? (Call the regional office of Environment, Health and Natural Resources.)
- What impact does litter and pollution have on a lake, pond or stream? (It kills fish and animals and creates poor water quality for human usage.)



Turning Trash Around



Objective: To illustrate how to prevent or eliminate pollution in an aquatic environment.

Time: One or two class periods.

Materials Needed: Squares of corrugated cardboard at least 10 inches by 10 inches (one per team), posterboard rectangles (10 per team), colored markers, paint, knife, crayons, scissors, construction paper, glue, tape.

Trash is the product of something no longer needed or used. But the ***trash*** you throw away doesn't go away. It ends up somewhere. Where does it go, and how does it get there?

It may go to a landfill or an ***incinerator***. Or it may end up in a stream or along the road where it becomes an eyesore and a potential danger to animals and people.

If left alone, nature could take care of itself. But people interfere with nature and often cause serious damage. We pollute the environment and make it unfit for many animals and us to live in.

But if people are the cause of the problems, can't they also be the solution?

Let's look at the differences between a healthy and an unhealthy ***aquatic*** environment and see what effects, positive and negative, that people can have.

Procedure

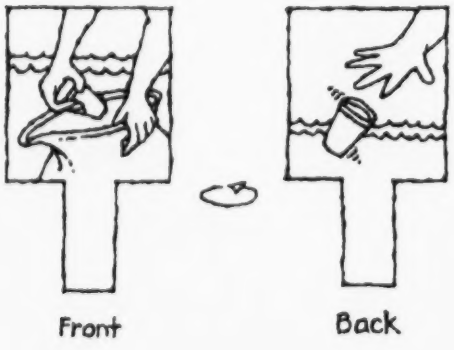
✂ Cut some of the poster board into squares with tabs in the bottom. Cut slits for tabs in one piece of the base (corrugated cardboard) to use as a demonstration.

✂ Explain to children that they are to design a display of a healthy aquatic ***ecosystem*** and a polluted aquatic ecosystem by constructing a model that can be viewed from two sides. Looked at one way, the model shows a polluted ecosystem. Turn it around, and it shows a healthy ecosystem and responsible human actions.

To generate ideas, discuss possible components -- manmade or natural -- of a healthy aquatic ecosystem. (Healthy plants and animals; clean water.)

What activities preserve an aquatic environment? (Properly disposing of litter and waste, recycling, swimming, canoeing, sailing.)

What are the components of an unhealthy aquatic ecosystem? What would the plants and animals look like? (Plants brown and wilting, animals sick or entangled in litter or absent altogether.)



What kinds of bad conditions might be present? (Industrial waste discharge, agricultural runoff, litter, an oil slick, a dump, soil erosion.)

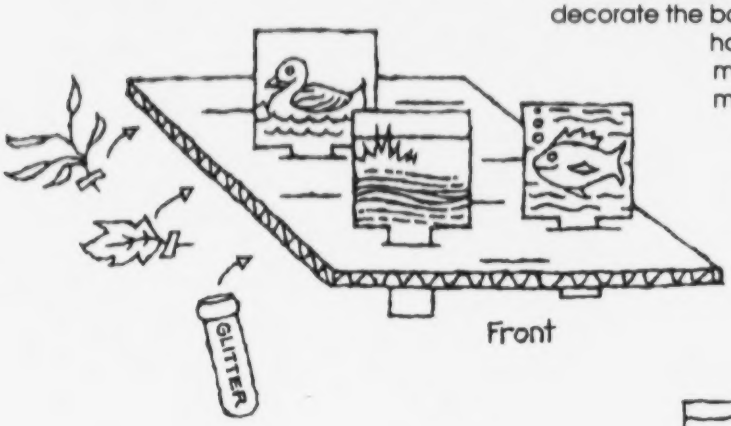
What harmful activities could be happening on a beach, lake or river? (Littering, ocean dumping, petroleum leaks from boats.)

✂ Show how to make the display using the base and one of the pre-cut cardboard pieces. Draw one component of a healthy aquatic ecosystem, such as an animal, on one side on the cardboard piece. On the other side, draw a man-made disturbance, such as the

same animal entangled in plastic. Put the tab of the piece into a slit on the base. Turn the board so the children can view both sides.

- Using baseboards and posterboard pieces, design a display of an aquatic habitat such as a beach, lake, river or wetland. You might decorate the baseboard to represent the habitat. For example, use "real" materials like sand or leaves or art materials such as blue glitter for water. It may be necessary for the leader to cut the slits in the baseboard.

Have children use their displays as story-boards and describe them to the group.



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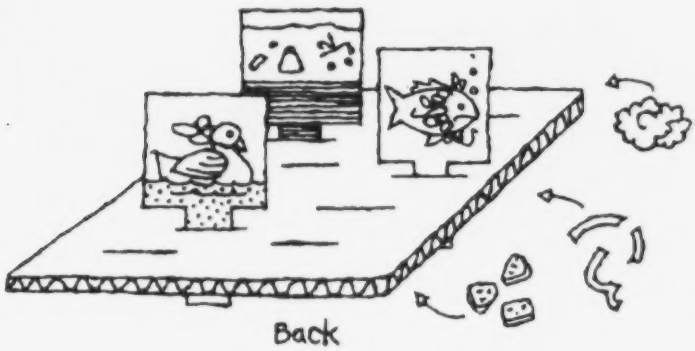

Back

Let's Talk About It

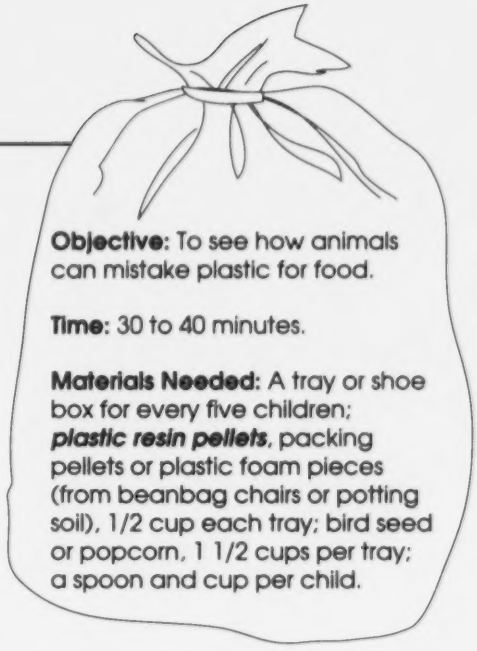
- Are all of people's interferences in nature harmful? (Not all of people's interferences in natural are harmful as most environments are flexible. However, any interferences, by people or nature, will cause changes.)

- What steps can be taken to change an unhealthy ecosystem into a healthy ecosystem? (The main culprits causing the unhealthy environment must be removed or lessened. Stress on the environment could be caused by runoff of fertilizers or pesticides, therefore we would need to improve the farming practices. In North Carolina, phosphate from detergent was contributing to the fertilizers already in rivers. A ban on phosphate detergent has reduced the amount of phosphate in river water by nearly 50 percent.)

- Is it "too late" for some habitats? Give examples. (This answer depends on the experiences of the children. An asphalt parking lot placed where a field or forest once stood certainly eliminates that habitat. However, the problems associated with runoff of rainwater from the parking lots can be slowed, thus improving the quality of nearby streams.)

- How can other people best be taught respect for the environment? (This is an excellent discussion question. Expect answers such as laws, enforcement, modeling, education and experience in a natural environment.)

The Early Bird Gets The . . . Plastic?



Objective: To see how animals can mistake plastic for food.

Time: 30 to 40 minutes.

Materials Needed: A tray or shoe box for every five children; ***plastic resin pellets***, packing pellets or plastic foam pieces (from beanbag chairs or potting soil), 1/2 cup each tray; bird seed or popcorn, 1 1/2 cups per tray; a spoon and cup per child.

Think about some of the plastic litter you've seen along the shore -- fast food containers, foam ice coolers, ***plastic foam*** surfboards.

What happens when these items are tossed into a lake or on a beach?

Eventually they break down into tiny pieces.

Sea gulls often can't tell the difference between plastic pieces and fish scraps so they often ***ingest*** trash. Finches have similar problems with seeds and plastic.

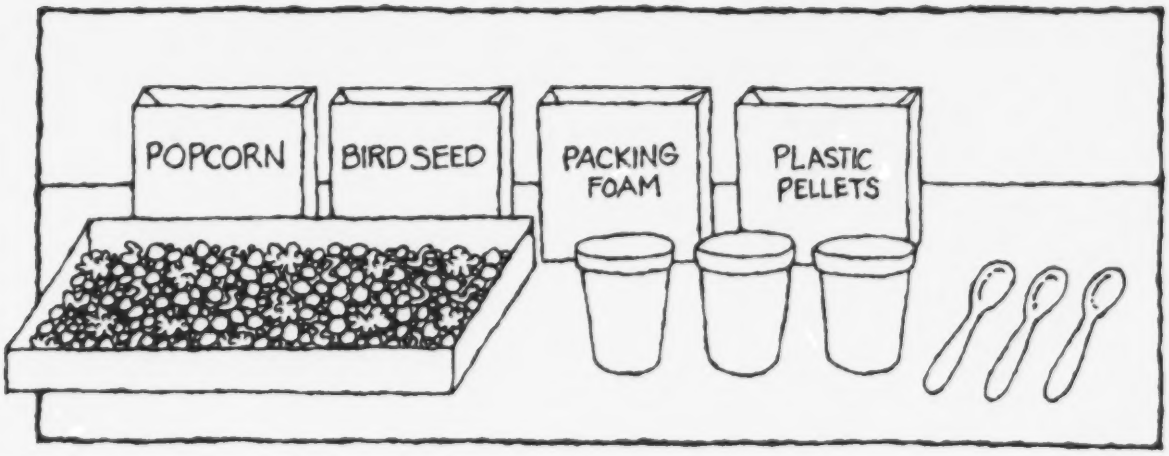
Feeding can be a frenzied activity.

Birds are likely to swallow before they taste. They can't digest plastic. So plastic just builds up in their stomachs taking the place of real food. Birds slowly starve.

Let's see how easily plastic can become an undesirable meal.

Procedure

The object of this game is to collect as much food as possible in the time allotted. Because of the collection method and the short time allowed, some plastic will be gathered also.



In each tray, mix plastic pieces with bird seed or popcorn.

Have three children "feed" at each tray for 30 seconds, using their spoons as beaks. Each child should place the spoonfuls of food into his or her cup or "stomach."

When time's up, the children will examine their cups for real food and plastic.

Count and record the pieces in two columns.

If math skills allow, do ratios, percentages or fractions.

Possible Analyses using Ratios of Plastic Pieces to Feed		
Plastic	**Real food**	**Potential Result**
1	10	No harm to bird.
2-4	10	Bird weakens.
5 or more	10	Bird dies by starving.

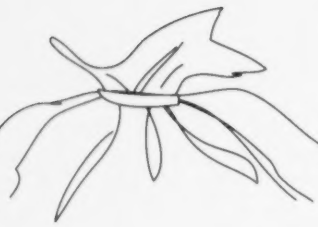
Stretching

- Repeat the feeding frenzy several times to see if the children can learn to select real food over plastic.
- Repeat the activity using blindfolds. Compare results.
- Do class averages to determine the health of the bird "population."

Let's Talk About It

- Why do you think birds would even consider selecting plastic to eat? (They can't tell the difference in the frenzy of feeding; the plastic pieces look a lot like food.)
- Where are you likely to find birds that have plastic in their stomachs? (Near urban areas, plastic manufacturing plants, shipping ports or landfills.)
- How could plastic affect a bird that dives for its food, such as a merganser? (Plastic in its stomach could make the bird more buoyant and thus restrict its ability to dive under for its prey.)
- What can we do to reduce the problems plastic creates for birds? (Reduce the plastic litter entering the environment; improve shipping procedures for plastic resin pellets.)

Paper Caper



Objective: To learn about recycling through an active recycling campaign in a classroom or community.

Time: Several hours a week.

Materials Needed: Information about recycling in your community.

Paper is one of the biggest trash items at school. In fact, waste paper is a heavy load everywhere. It takes up more space than any other material dumped in our landfills today!

More than 500,000 trees are used to produce the Sunday papers, only 12 percent of which are recycled.

It has been estimated that the average American will use seven trees each year in paper and wood products. Think of the paper used each day at school!

Recycling conserves our precious forest lands and saves valuable landfill space.

It also preserves the quality of our air. Using recycled materials creates less pollution than making products from raw materials.

You can do your part by starting a recycling project at your school. For instance, your class could be in charge of a paper collecting project.

Recycling is the ultimate paper caper!

Procedure

You will need to find out about the closest recycling pickup station and its requirements for the materials you want to recycle. See if arrangements can be made to get your paper to the recycling station. The station may supply you with bins to be placed at school and emptied by station personnel. Or you could use large cardboard boxes or barrels from a manufacturing company.

Your class needs to plan what will be recycled, who will have which jobs in collecting and how others will be informed about the project.

Enlist the help of computer, art, media and drama teachers. You might work in groups to plan education and advertising. Here are some ideas.

■ **Education**

Plan presentations or develop material about recycling and how your school will be involved.

- ❒ Make overhead transparencies
- ❒ Write and perform a play
- ❒ Publish booklets
- ❒ Print a newspaper
- ❒ Make a videotape
- ❒ Design a computer presentation
- ❒ Present a puppet show
- ❒ Prepare a slide show

■ **Advertising**

Plan how the project will be advertised and how to get people involved. Collect and decorate boxes to place in each classroom.

- ❒ Make signs by hand or computer

- ❒ Decorate T-shirts
- ❒ Make buttons
- ❒ Make announcements on the PA system
- ❒ Write a song

Stretching

- ❖ Once you've conquered paper, see if your school can recycle aluminum cans, glass and plastic.
- ❖ "Adopt" five neighbors and collect their paper for recycling.
- ❖ Make your own recycled note paper. (See Project Learning Tree for grades 7-12, "How Paper Is Made," 1977. Forestry Extension, Box 8003, NCSU, Raleigh, NC 27695-8003, 919/737-3386.)

Let's Talk About It

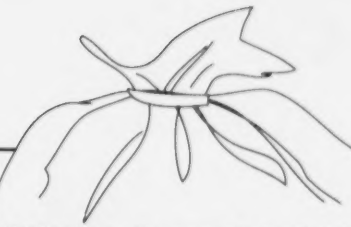
- ◆ What are the benefits of a recycling project in school? (Students actually design and carry out a project that affects their environment. It can encourage recycling at home and point to wasteful procedures. In other words, reducing waste is as important as recycling.)
- ◆ What are some problems you could encounter with this project? (No recycling center nearby, no neat way to store old paper, potential fire hazard, lack of support.)
- ◆ List some places and ways paper is used in a school. (Student notes, tests, texts, library, art, cafeteria and restrooms.)

References

The following publications may be helpful in teaching about recycling: Audubon Adventures, Ranger Rick Magazine, N.C. Wild Notebook, National Geographic World Magazine, 3-2-1 Contact.

For information about recycling in your community, check with your local Keep America Beautiful coordinator or your city or county government office. Or call the state recycling coordinator in the Department of Environment, Health and Natural Resources at 919/733-0692.

Trash-to-Treasure Art



Objective: To recycle trash into bookmarks and buttons.

Time: 30 minutes.

Materials Needed: Construction paper scraps, old greeting cards, jar lids (shallow, such as spaghetti sauce or pickle jar lids), thin paper, cereal box cardboard, colored pens, scissors, clear plastic contact paper, safety pins, hot glue gun, glue and tape.

Push this button!

We are now activated to spring into action, turning trash into treasure, recycling junk into art!

Do you want to set a good example?

Then let's show people how to reuse trash by wearing a colorful button made from a jar lid.

Or we can read books on reducing the garbage glut and mark the pages with a bookmark made from paper scraps.

Junk art is a fun gift to give yourself or to trade with friends. Let's get started!

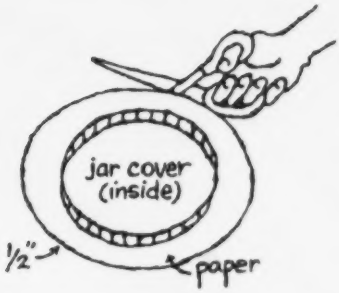
Procedure

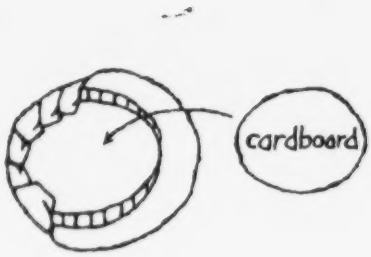
Bookmarks

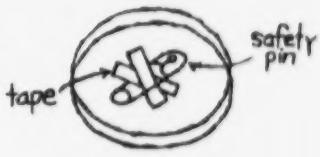
✐ Color the sample bookmarks on page 33. Glue bookmarks to scrap construction paper, cereal box cardboard or old greeting cards. When glue is dry, cut out bookmarks and they're ready to use.

Buttons

✐ On a piece of paper, draw a circle an inch larger than your jar lid. Draw a simple picture and write a brief message. Be sure to leave some blank space around the edge so your design







won't get folded under.

Color your design with felt pens and cut it out. Glue paper design onto jar lid, folding edges neatly under inside of rim.

On clear contact paper, draw a circle one inch larger than your jar lid and cut it out. Peel off backing and center over design. Press down and smooth out air bubbles. Fold edges neatly over the lid's inside rim.

Cut out a cardboard circle that is slightly smaller than your jar lid. Glue cardboard circle into inside of jar lid snugly. Fasten a safety pin to the cardboard with tape or glue.

The recycled jar lid is now an environmental button ready to wear.

Stretching

- **Trash-with-Flash Fashion Show**

  Using all kinds of trash items, create new fashions. For beachwear, make surfing trunks from old wallpaper samples and funky shades from cereal box cardboard. For evening wear, fringe a hefty sack into a gown and turn paper grocery bags into a tux complete with tails. Decorate a box with foil pans for that space-age outfit with futuristic flair! Model your fashions before an audience. Walk down a lighted runway and choreograph your creations to music. Trash never looked so good!

- **Junk Art Jewelry**

  Create some accessories to finish off those fashions. Make a pop-tab necklace and gum-wrapper earrings to match. Make cufflinks and rings from anything!

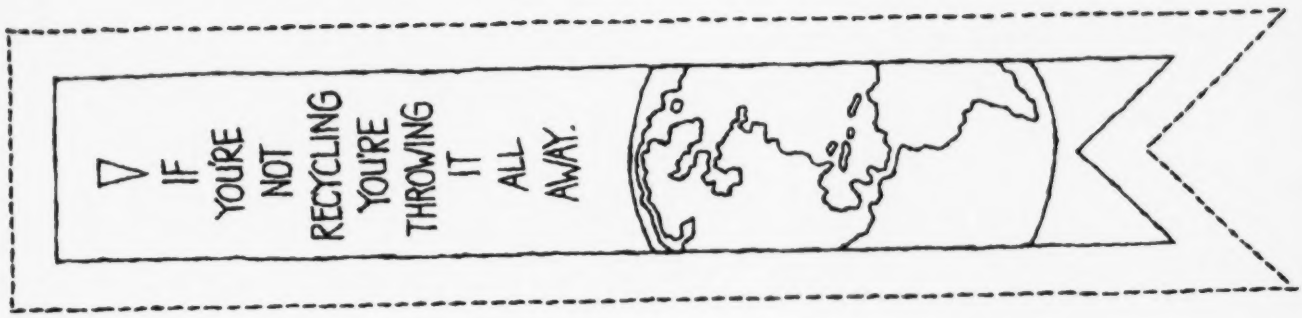
- **Throwaway Talent Show**

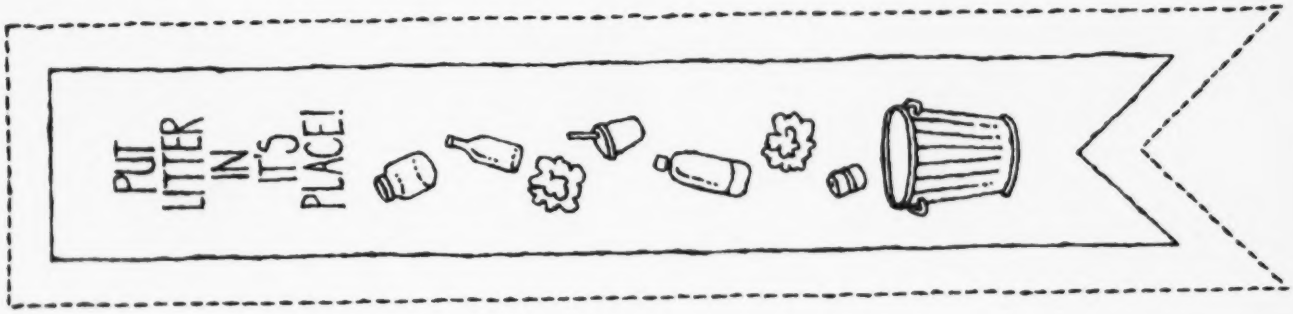
  Wear aluminum soda cans on your feet and tap dance the night away. Whistle across old bottles. (Fill bottles with varying amounts of water to change the sounds. Do-Re-Mi!) Form a jazzy junk band.

- **Invention Convention**

  Challenge your friends to make one trash item into something useful or reusable. Demonstrate and display your inventions. Award yourself a patent.

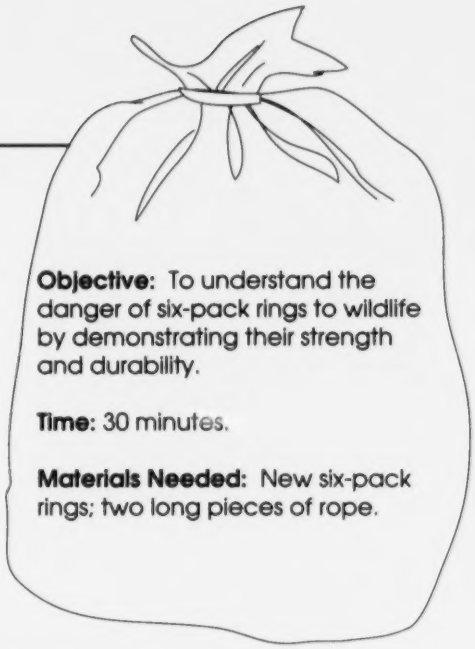
Color and cut out.





Make your own!

Wildlife Tug of War



Objective: To understand the danger of six-pack rings to wildlife by demonstrating their strength and durability.

Time: 30 minutes.

Materials Needed: New six-pack rings; two long pieces of rope.

Remember when you tried to put on your shoes from last year but they were too tight?

Did they hurt your feet?

Animals don't have to wear shoes, but sometimes they find themselves wearing something that is too tight and uncomfortable. Sometimes it even kills them.

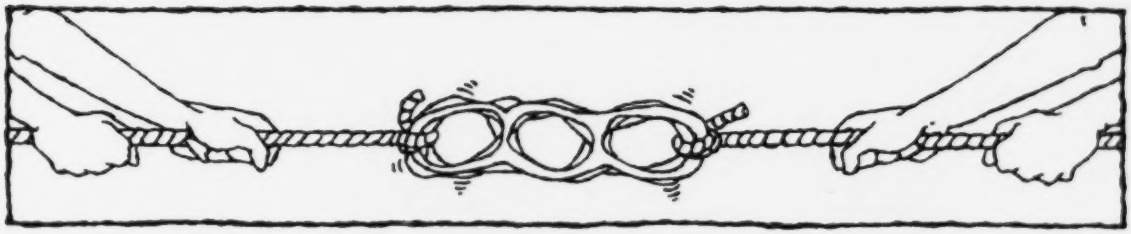
Take this six-pack ring, for instance. (Hold up a six-pack ring.)

How can this plastic cause major problems for animals? Let's put ourselves in their shoes.

Procedure

Ask for two volunteers. Hand each one a six-pack ring. Tell them to break it using only their hands. If they can't, tell them to try together to break it. Ask the children if they think that a deer, sea gull, duck or otter could stretch a six-pack ring.

Fold two six-pack rings together lengthwise into four three-packs. Tie a piece of rope to each



end and play tug-of-war, adding two children at a time. How many people did it take to break a ring? Can wildlife win in a tug-of-war?

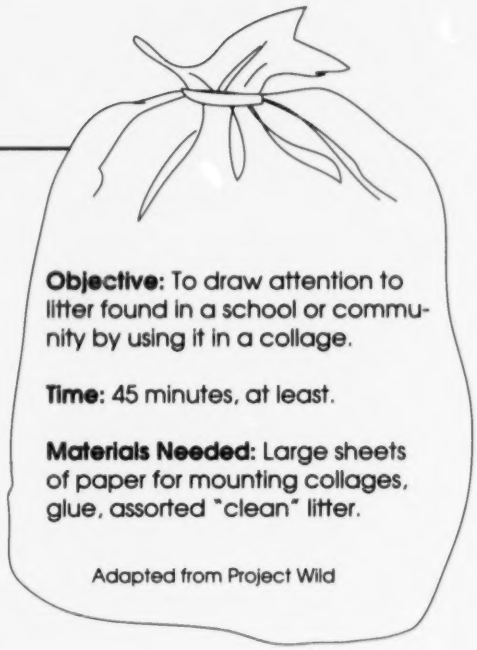
Stretching

- Suspend a six-pack ring and add weights. How much weight can one support?
- Compare the strengths of ***photodegradable*** six-pack rings that have been exposed to sunlight for varying lengths of time. Allow four to six months for degradation under full sunlight outdoors. (North Carolina now requires six-pack rings to be photodegradable. Look for the small diamond shape in the plastic.)

Let's Talk About It

- If you were a fish, bird or seal and you had a six-pack ring around your neck, how could you free yourself? (Rub or scratch it off.)
- If you didn't free yourself, what could happen? (You could strangle or starve.)
- What can you do to prevent six-pack rings from entangling wildlife? (Cut the loops of each ring with scissors and dispose of properly.)

Designs on Litter



Objective: To draw attention to litter found in a school or community by using it in a collage.

Time: 45 minutes, at least.

Materials Needed: Large sheets of paper for mounting collages, glue, assorted "clean" litter.

Adapted from Project Wild

Can something beautiful be made of litter? Can we learn something from a pile of rubbish?

Let's pick up some abandoned trash from outside. Then let's arrange these items into a collage.

You get to decide your theme or design.

Procedure

Divide the group into teams of three to five children. Ask each team to collect litter from the school cafeteria and schoolyard, church grounds or community. They should not take things out of garbage cans.

Have available an assortment of litter to supplement what the children collect. You should have plastic, paper, plastic foam and aluminum.

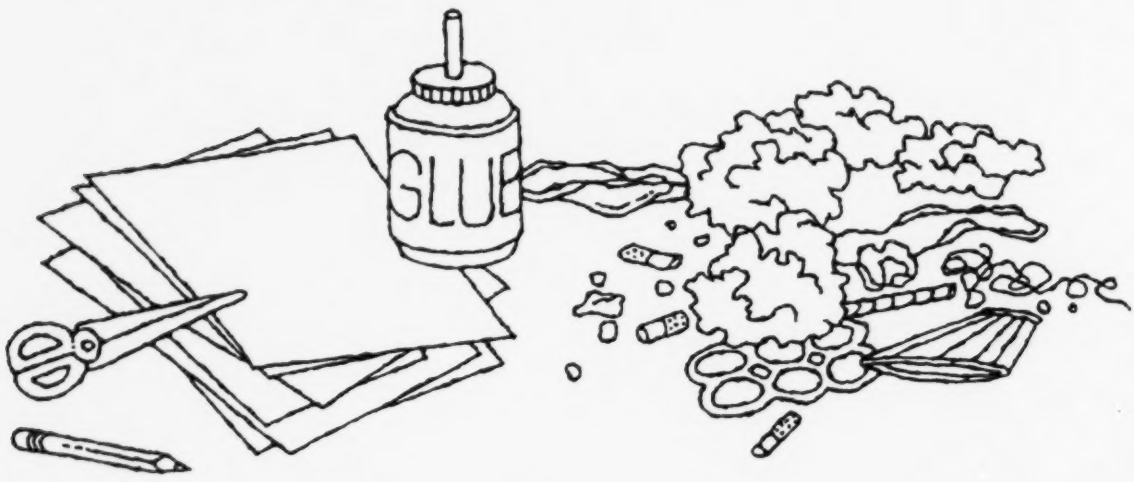
Have the teams make and display collages using the items.

Stretching

- Collect trash items from one specific site such as a community park or lake. Arrange the trash into a collage, sculpture or statue. Exhibit the artwork in a public place to make people aware of the variety and volume of litter that exists.

Let's Talk About It

- What can we learn from these collages? (The kinds of litter found on the schoolyard or in the community; something about the people who litter, for example, they chew gum, smoke, eat candy bars, write love notes, etc.)



Glossary

aquatic: Having to do with water.

aluminum: A lightweight, recyclable material used to make some beverage cans.

biodegradable: Organic-based materials, such as paper, that can be broken down by bacteria.

bouyancy: The tendency to float .

compost: A mixture of decomposing food, wood, manure or other organic material used to fertilize and enrich the soil. As a verb, to convert into compost.

data: Information from which conclusions can be drawn.

debris: Pieces of rubbish or litter.

ecosystem: A system made up of a community of animals, plants and bacteria and its interrelated physical and chemical environment.

entanglement: Situation in which animals are caught or ensnared.

habitat: The native environment of a plant or animal.

incinerator: A furnace or device in which trash is burned.

ingest: To take into the body by swallowing; to eat.

landfill: A designated area in which garbage is buried.

litter: Items disposed of improperly, such as on a road or along a shoreline.

photodegradable: Material that decomposes with exposure to sunlight (ultraviolet rays).

plastic: Petroleum-based material. Can be rigid or flexible. Is not biodegradable. While it can be broken into smaller pieces, it will never degrade into soil.

plastic foam: Material used in packaging materials, fast food containers, coolers and cups. Trademark name is "Styrofoam."

plastic resin pellets: Petroleum-based manufacturing forms of shipping plastic for shaping in another industry. The pellets are about the size of marbles or fish eggs.

recycling: Process by which materials otherwise destined for disposal are used again in manufacturing new products.

solid waste: Unwanted or discarded materials under the general terms of refuse, trash, garbage and debris.

stewardship: Assuming personal responsiblity, in this case, for the environment.

trash: Waste materials; refuse.

Materials

A Citizen's Guide to Plastics in the Ocean: More Than a Litter Problem. 1988. Center for Marine Conservation, 1725 DeSales Street, NW, Washington, DC 20036. 202/429-5609. $8.95.

Cleaning North America's Beaches: 1989 Beach Cleanup Results. Center for Marine Conservation, 1725 DeSales Street, NW, Washington, DC 20036. 202/429-5609. $12.

Trashing the Oceans. 1988. Eight minute video. Center for Marine Conservation, 1725 DeSales Street, NW, Washington, DC 20036. 202/429-5609. $10.

Project Learning Tree. Extension Forest Resources, Box 8803, NCSU, Raleigh, NC 27695-8003. 919/737-3386.

Project WILD. N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, NC 27611. 919/733-7123.

River's Edge: 4-H Environmental Science Adventure Activity Sheets. 4-H Special Programs, Box 7606, NCSU, Raleigh, NC 27695-7606.

Coming Full Circle: Successful Recycling Today. 1988. Environmental Defense Fund, 257 Park Avenue South, New York, NY 10010.

Environmental Education: A World of Knowledge. Grades 3-5. 1990. Keep North Carolina Clean & Beautiful, Inc., St. Mary's Place, 887-A Washington St., Raleigh, NC 27605. 919/834-9869.

Marine Debris. Slide show. UNC Sea Grant, NCSU, Box 8605, Raleigh, NC 27695-8605. 919/737-2454. $12.

Let's Recycle. 1990. A Big Sweep board game for middle grades. Free. N.C. Wildlife Resources Commission, 512 N. Salisbury Street, Raleigh, NC 27611. 919/733-7123.

Waste in Place, K-6, and *Waste - A Hidden Resource,* 7-12. Includes computer program. Keep America Beautiful Inc., 9 West Broad St., Stamford, CT 09602. 203/323-8987.

Recycling Study Guide. Wisconsin Department of Natural Resources, Recycling Coordinator, Bureau of Solid Waste Management, PO Box 7921, Madison, WI 53707. 608/267-7565.

Current: Journal of Marine Education. Vol. 9(1). Special issue on marine debris. Nora Deans, Editor, PO Box 51215, Pacific Grove, CA 93950. $4.

Municipal Solid Waste. 1989. Activity book to help middle and secondary school students investigate and evaluate solid waste issues, including littering, ocean dumping, landfilling and bottle bills. $14.60. Stipes Publishing Company, 10-12 Chester St., Champaign, IL 61820. 217/356-8391.

Teachers and Educators Packet of Resources, Materials and Contacts. Free. Center for Marine Conservation, 1725 DeSales Street, NW, Washington, DC 20036. 202/429-5609.

Posters

"Don't Teach Your Trash to Swim." Free. Center for Marine Conservation, 1725 DeSales Street, NW, Washington, DC 20036. 202/429-5609.

"Marine Debris: Get A Grip on It." Free. Octopus picking up trash. Washington Sea Grant Marine Advisory Services, 3716 Brooklyn Ave., NE, Seattle, WA 98105.

"Stow It, Don't Throw It." Free. Connecticut Marine Trades Association, 274 Silasdeane Highway, Weathersfield, CT 06109.

"Pop-Eye's Advice." Free. Center for Marine Conservation, 1725 DeSales Street, NW, Washington, DC 20036. 202/429-5609.

"Big Sweep." Free. UNC Sea Grant Office, Box 8605, NCSU, Raleigh, NC 27695-8605.

Resources

Center for Marine Conservation, 1725 DeSales Street, NW, Washington, DC 20036. 202/429-5609.

Keep America Beautiful Coordinators (check with your county government or KNCCB).

Keep North Carolina Clean & Beautiful, Inc. (KNCCB), St. Mary's Place, 887-A Washington St., Raleigh, NC 27605. 919/834-9869.

Streamwatch, N.C. Division of Water Resources, P.O. Box 27687, Raleigh, NC 27611. 919/733-4064.

State Recycling Coordinator, N.C. Division of Solid Waste Management, P.O. Box 27687, Raleigh, NC 27611. 919/733-0692.

N.C. Wildlife Resources Commission, Archdale Building, 512 N. Salisbury Street, Raleigh, NC 27611. 919/733-7123.

N.C. Division of Coastal Management, Archdale Building, 512 N. Salisbury Street, Raleigh, NC 27611. 919/733-2293.

N.C. Division of Parks & Recreation, 12700 Bayleaf Road, Raleigh, NC 27614. 919/846-9991.

UNC Sea Grant, Box 8605, N.C. State University, Raleigh, NC 27695-8605. 919/737-2454.

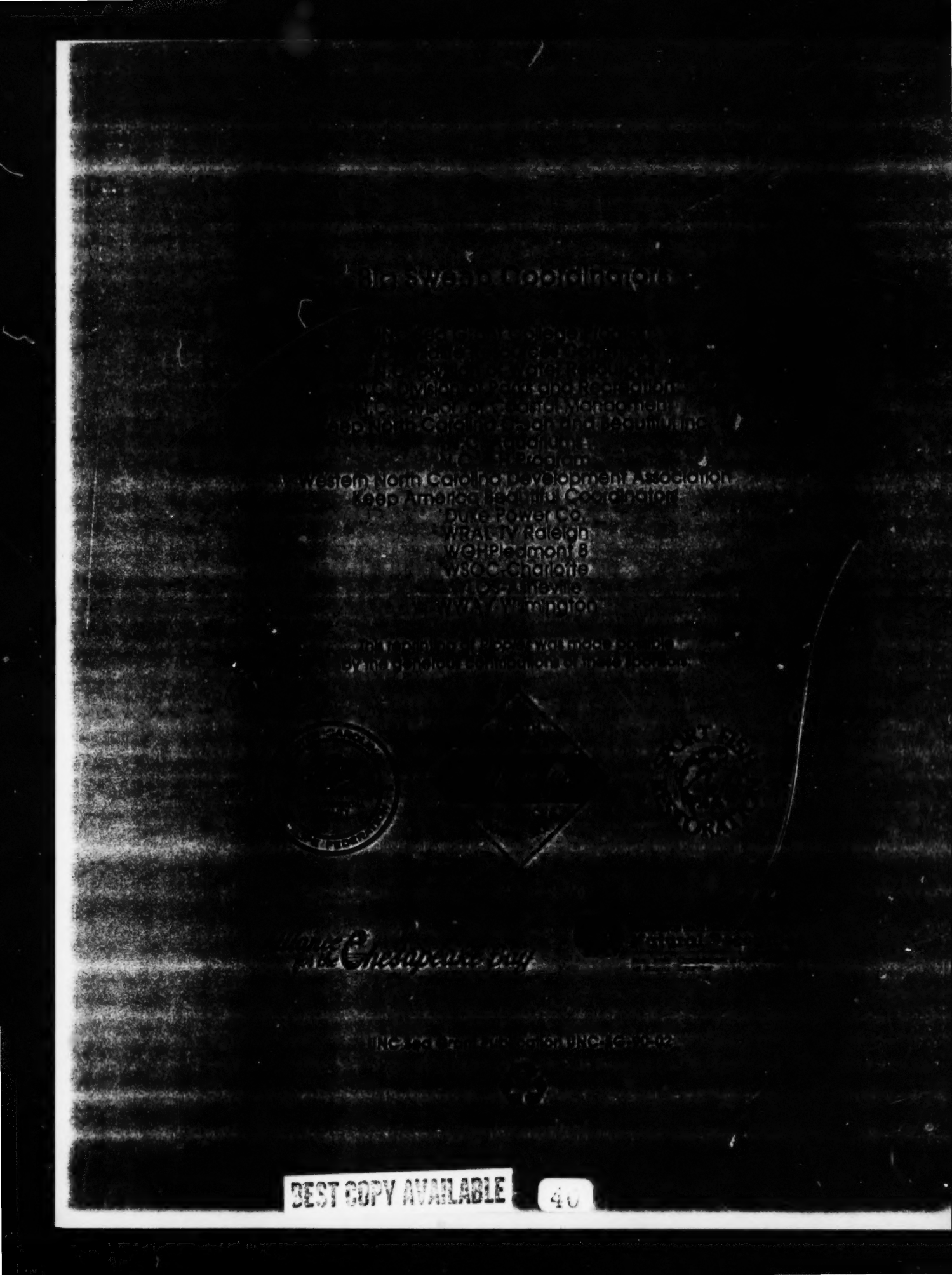
Soil & Water Conservation Districts (check for each county), N.C. Division of Soil & Water Conservation, P.O. Box 27687, Raleigh, NC 27611. 919/733-2302.

N.C. Office of Environmental Education, P.O. Box 27687, Raleigh, NC 27611. 919/733-0711.

N.C. Aquariums, Education Curators
Roanoke Island, Manteo, NC 27954. 919/473-3493.
Pine Knoll Shores, Atlantic Beach, NC 28512. 919/247-4003.
Fort Fisher, Kure Beach, NC 28449. 919/458-8257.

N.C. Wildlife Federation, P.O. Box 10626, Raleigh, NC 27605. 919/833-1923.

National Marine Education Association, P.O. Box 130 , Kure Beach, NC 28449.



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